Lambert J. Is occupational noise exposure during pregnancy a risk factor of damage to the auditory system of the fetus? Am J Ind Med. 1986;10:427–435)

There are further effects of birth outcomes and although the maternal abdomen and uterus filter out most high-frequency sounds and lessen dB levels, preterm infants in the neonatal intensive care unit (NICU) have no such protection. While in the NICU, the preterm infant is fully exposed to a broad range of sound frequencies (high and low) at dB levels that may be unsafe. (SAFE SOUND EXPOSURE IN THE FETUS AND PRETERM INFANT, Charlene Krueger, Associate professor, Elan Horesh, Pre-med student, and Brian Adam Crosland, Pre-med student)

In addition the "deafening" music used Abu Gharib prison in 2003 is considered **"no touch" torture considered to be a violation of basic human rights.** (Torture Methods with Sound: How pure noise can be used to break you psychologically; Justin Caba 1/20/2015 Medical Daily)

There is also evidence that noise pollution and air pollution go hand in hand, fine particle air pollution and noise pollution increase risk through similar biologic pathways imbalance in autonomic nervous system, can cause thoracic aortic calcification (Study presented at the American Thoracic Society International Conference May 17-22, 2013 Philadelphia, Pennsylvania)

During sleep, the brain rests busy neurons and forms new pathways so you're ready to face the world in the morning. In children and young adults, the brain releases growth hormones during sleep. While you're sleeping, your body is also producing proteins that help cells repair damage.(Written by Ann Pietrangelo Medically Reviewed by George Krucik, MD, MBA on August 19, 2014)

Gastrointestinal Difficulties

There are increasing evidences for gastrointestinal motility disorder (GIMD) and gastric stress ulcer induced by noise stress. The present study was to investigate the reversed effect of melatonin on GIMD and gastric stress ulcer induced by noise stress and potential mechanism.

Moreover, the levels of cortisol, motilin and malondialdehyde in blood plasma and malondialdehyde in gastric mucosa homogenate were increased by noise stress ($P < 0.05$). CGRP and superoxide dismutase activity in both of blood plasma and gastric mucosa homogenate were significantly decreased ($P < 0.05$). Furthermore, melatonin reversed changes in GRR, SPR, pathological examination, Guth injury score, cortisol, motilin, CGRP, superoxide dismutase activity and malondialdehyde ($P < 0.05$). (Melatonin Attenuates Noise Stress-

induced Gastrointestinal Motility Disorder and Gastric Stress Ulcer: Role of Gastrointestinal Hormones and Oxidative Stress in Rats
Lei Zhang,1,2,3 Ji T Gong,4 Hu Q Zhang,5 Quan H Song,2 Guang H Xu,3
Lei Cai,3 Xiao D Tang,2 Hai F Zhang,1 Fang-E Liu,1,* Zhan S Jia,6,* and
Hong W Zhang3, J Neurogastroenterol Motil. 2015 Apr; 21(2): 189–199.)

Raised cortisol levels, which occur due to the significant stress, most people experience from the anticipation and actual noise emitted by the Growlers have a significant impact on our digestive system.

> When the brain feels severely stressed, it unleashes a cascade of hormones that can put the whole digestive system in an uproar. The hormones have different and sometimes contradictory jobs. For example, the hormone CRH (short for corticotropin-releasing hormone) is one of the body's main alarm bells. In stressful situations, the brain pumps out CRH to tell the adrenal gland to start making steroids and adrenaline, chemicals that can give you the strength and energy to run or fight your way out of trouble.

This stress, despite our different responses to stress, affects: irritable bowel syndrome, indigestion, heartburn, ulcerative colitis, and Crohn's disease.
The National Institutes of Health estimates that as many as one in five Americans has some signs of IBS. (Stress and the Digestive System,Chris Woolston, M.S.)

Disturbances in Mental Health

> Noise pollution is not believed to be a cause of mental illness, **but** it is assumed to accelerate and intensify the development of latent mental disorders. Noise pollution may cause or contribute to the following adverse effects: anxiety, stress, nervousness, nausea, headache, emotional instability, argumentativeness, sexual impotence, changes in mood, increase in social conflicts, neurosis, hysteria, and psychosis. Population studies have suggested associations between noise and mental-health indicators, such as rating of well-being, symptom profiles, the use of psychoactive drugs and sleeping pills, and mental hospital admission rates. *Children, the elderly, and those with underlying depression may be particularly vulnerable to these effects because they may lack adequate coping mechanisms. Children in noisy environments find the noise annoying and report a diminished quality of life.*
> Noise levels above 80 dB are associated with both an increase in aggressive behavior and a decrease in behavior helpful to others. The news media regularly report violent behavior arising out of disputes over noise; in many cases these disputes ended in injury or death. The aforementioned effects of noise may help explain some of the dehumanization seen in the modern, congested, and noisy urban environment.

Impaired Task Performance

The effects of noise pollution on cognitive task performance have been well studied. Noise pollution impairs task performance at school and at work, increases errors, and decreases motivation. *Reading attention, problem solving, and memory are most strongly affected by noise.* Two types of memory deficits have been identified under experimental conditions: recall of subject content and recall of incidental details. Both are adversely influenced by noise. Deficits in performance can lead to errors and accidents, both of which have health and economic consequences.

Cognitive and language development and reading achievement are diminished in noisy homes, even though the children's schools may be no noisier than average. Cognitive development is impaired when homes or schools are near sources of noise such as highways and airports. Noise affects learning, reading, problem solving, motivation, school performance, and social and emotional development. These findings suggest that more attention needs to be paid to the effects of noise on the ability of children to learn and on the nature of the learning environment, both in school and at home. Moreover, there is concern that high and continuous environmental noise may contribute to feelings of helplessness in children. Noise produces negative after-effects on performance, particularly in children. It appears that the longer the exposure, the greater the effect. Children from noisy areas have been found to have heightened sympathetic arousal indicated by increased levels of stress-related hormones and elevated resting blood pressure. These changes were larger in children with lower academic achievement. As a whole, these findings suggest that schools and daycare centers should be located in areas that are as noise-free as possible.

(Noise Pollution: A Modern Plague Lisa Goines, RN; Louis Hagler, MD *Southern Medical Journal* 2007;100(3):287-294. Â©2007 Lippincott Williams & Wilkins)

The potential for classroom interference from single aircraft events generating sound levels inside classrooms greater than 50 dB Lmax would increase under Alternative 1 by up to two events per hour (at S01, S02, and S03) compared to the No Action Alternative; that is, on average, no school would experience an increase of more than two learning-disrupting events per hour under any scenario under Alternative 1 compared to the No Action Alternative. Oak Harbor High School (S01) and Crescent Harbor Elementary School (S02) under Scenarios B and C (with windows open) and ***Coupeville Elementary (S03) under Scenario A (with windows closed) show the highest increase of classroom/learning interference, at an additional two events per hour.*** *All other schools either show no change from the No Action Alternative or an increase of one event per hour during the school day, primarily under the windows open condition. Under the windows-closed condition, nearly all of the schools would be expected to experience more than one additional event per hour of classroom/learning interference, with most being unchanged from the No Action Alternative.* ***Many modern schools have central air conditioning and heating systems; therefore, it is more***

likely that classroom windows would remain closed the majority of the time.
(DEIS 4-42)
Additionally:
Because the individual is assumed to be indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. (DEIS, pg.4-37)

Most of the base consists of 0 (zero) interruptions per hour, so an additional +2 interruptions is an understatement....*increases range from zero to an increase of three events per hour (P03), depending on the scenario.* (DEIS, 4-44)

35,100 FCLP's = 96 flights **per day/24hr**
Eliminating the weekends: 52 weeks per year = 261 days = 134 per day/24hr
24 weeks of average school year days = 120 days (excluding vacations) = 8.375prhour/ 16hours (excluding nights.)
With the average school hours at Coupeville Elementary School is 6.5 hours, which would equal 8 interruptions per average 50min. class period. One every 6 minutes.
Bear in mind this is an AVERAGE and speech interruptions could increase significantly on busier days.

The Coupeville Elementary School, which is listed as a point of interest in the DEIS, was build in 1990 and is not considered to be a "modern" school. It has no air conditioning and during warmer weather the windows in almost all classrooms are open. So the assumption that classroom windows are closed most of the time is just that: an assumption. Coupeville Middle and High Schools are not even considered as a point of interest in the DEIS. Therefor possibly subjecting school children (whose hearing is considered to be part of the "sensitive" population) to possible hearing loss as stated in the DEIS (p.4-20):

Other supplemental metrics utilized in the analysis show additional events of indoor and outdoor speech interference, an increase in the number of events causing classroom/ learning interference, an increase in the probability of awakening, and an increase in the population that may be vulnerable to experiencing potential hearing loss of 5 dB or more.
Yet on pg.4-45 they contradict this:
The available literature on the subject of permanent threshold shifts and aircraft noise exposure indicates that exposure to military aviation noise has not resulted in permanent threshold shifts, even in sensitive populations such as children.
So which is it? The contradictions in the DEIS are there to obviously confuse the reader.

A major effect of noise and poor acoustics in the classroom is the reduction of speech intelligibility. If children are unable to understand the teacher then the major function of a classroom in providing an environment that enables the transfer of information from teacher to pupil is impaired. Hearing, unlike sight and other senses, is not unidirectional.

We hear what is all around us, 360 degrees, keeping us in touch with our environment as no other sense does.

> It "is important, both for learning and for social interaction, that children are able to hear and understand their peers in the classroom." (Shield B. M. & Dockrell J. E. External and internal noise surveys of London primary schools, Journal of the Acoustical Society of America. 2004, 115(2), 730-738.)

Another study found that chronic exposure to aircraft noise "was associated with a significant impairment in reading comprehension.

> A 5-decibel difference in aircraft noise was equivalent to a 2-month reading delay in the United Kingdom and a 1-month delay in the Netherlands" (Stansfeld et al., 2005, p. 1946). This outcome was consistent with findings from other studies on the effects of aircraft noise on reading comprehension. Because it was a cross-sectional study, the effect of long-term noise exposure to aircraft noise could not be measured. Socioeconomic status was not found to be a factor in the size of the effect, a finding that differs from findings of other studies. The study also found that aircraft noise was "not associated with impairment in working memory, prospective memory, or sustained attention" (Stansfeld et al., 2005, p. 1946). Stansfeld et al. (2005) also looked at the effect of traffic noise on the children. The authors noted linear exposure-effect associations between exposure to road traffic noise and increased functioning of episodic memory, in regard to information and conceptual recall (Stansfeld et al., 2005, p. 1947).

Further:

> Concerning chronic effects, despite inconsistencies within and across studies, the available evidence indicates that enduring exposure to environmental noise may affect children's cognitive development. Even though the reported effects are usually small in magnitude, they have to be taken seriously in view of possible long-term effects and the accumulation of risk factors in noise-exposed children (Evans, 2004). Obviously, the findings reported in this review have practical implications for the acoustical design of schools, for the placement of schools in the vicinity of airports, and for the policy of noise abatement.
> (Does noise affect learning? A short review on noise effects on cognitive performance in children Maria Klatte,* Kirstin Bergström, and Thomas Lachmann, August 2013)

Children often participate in recreational activities that can harm hearing. These activities include attending music concerts and sporting events, reworks, playing with noisy toys and video games, and listening to personal music players and persistent jet noise is no exception. Because of excessive exposure to noise, an estimated 5 million children suffer from Noise Induced Hearing Loss

(NIHL). In addition, noise exposure can harm a child's physical and psychological health.
Noise can pose a serious threat to a child's physical and psychological health, including learning and behavior. For example, directly from the EPA (Environmental Protection Agency) noise can:

> INTERFERE WITH SPEECH AND LANGUAGE. Repeated exposure to noise during critical periods of development may affect a child's acquisition of speech, language, and language-related skills, such as reading and listening.
> IMPAIR LEARNING. The inability to concentrate in a noisy environment can affect a child's capacity to learn.
> IMPAIR HEARING. Tinnitus, often described as a ringing or buzzing sound in the ear, is a symptom associated with many forms of hearing loss. (United States Environmental Protection Agency I Office of Air and Radiation I Washington, D.C. 20460 EPA-410-F-09-003 I www.epa.gov/air/noise.html I November 2009

Here is a list of additional Studies regarding the effects of noise on learning.

- Preschoolers in daycare centers located near elevated trains in New York City did poorer on psychomotor skills than their counterparts in quieter neighborhoods did. (Hambrick-Dixon, *Developmental Psychology,* 1985)
- Older students who attended schools near major New York airports had lower reading scores than children in schools located further from the airports did. (Green & Shore, *Archives of Environmental Health,* 1982)
- Children living near noisy highways in Los Angeles had lower reading scores and children living near a major airport there had more difficulty solving cognitive problems. (Cohen, Glass and Singer, *Journal of Experimental and Social Psychology,* 1973 and 1980)
- In one New York City school, a study focused on students in grades two, four, and six. Half of the classes at each grade level were in classrooms adjacent to train tracks; the other half of the classes were on the quieter side of the building. The study showed that the reading levels of the students on the noisy side of the building were behind the reading levels of their peers on the quiet side of the building. The sixth graders on the noisy side of the building averaged as much as one year behind in reading. (Bronzaft & McCarthy, *Environment and Behavior,* 1975) Then rubber pads were installed on the nearby train tracks and acoustic ceiling tiles were installed on ceilings of the noisiest classrooms. Those noise-abatement measures cut the noise levels in the noisy classrooms by as much as eight decibels. (Noise levels are cut in half for every ten-decibel decrease in measured sound.) A two-year study following the installation of the rubber pads and acoustic tiles showed no differences in reading levels between classes on the two sides of the building. (Bronzaft, *Journal of Environmental Psychology,* 1981)

- A study of seventh and tenth graders found that the high-academic students were not affected by nearby airport noise while lower-achieving students were affected. (Maser, Sorensen, Kryter & Lukas, Western Psychological Association Conference, 1978)
- Noise is more bothersome in crowded classrooms; teachers in those classrooms might resort to quieter, less effective teaching methods because of the conditions. (Gifford, *Environmental Psychology,* Allyn and Bacon, Inc., 1987)
- Language and cognitive skills develop more slowly in children raised in noisy homes. Possible reason: Parents in noisy homes interact less often with their children. (Wachs, American Psychological Association Conference, 1982)

<u>It is important to note that the effects of noise pollution may not have an immediate effect but may be noticed many years later and limiting a child's possible potential.</u>

Obviously there is enough research to indicate that the DEIS underestimates the effects of noise on children's learning. Additionally the DEIS appears to ignore effects of impact (sudden) noise.

Potential Hearing Loss

The available literature on the subject of permanent threshold shifts and aircraft noise exposure indicates that exposure to military aviation noise has not resulted in permanent threshold shifts, even in sensitive populations such as children. The 1982 U.S. EPA Guidelines for Noise Impact Analysis provides that people who experience continuous, daily exposure to high noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week, beginning at an age of 20 years old, may be at risk for a type of hearing loss called Noise Induced Permanent Threshold Shift (NIPTS). (DEIS, 4-45,46) *...... Additionally, the report found that there were no major differences in audiometric test results between military personnel who, as children, had lived on or near installations where jet aircraft operations were based and military personnel who, as children, had no such exposure (Ludlow and Sixsmith, 1999; ACRP 2008).*
.....To put the conservative nature of this analysis into context, the national average of time spent indoors is approximately 87 percent (or almost 21 hours of the day) (Klepeis et al., n.d.). With intermittent aircraft operations and the time most people spend indoors, it is very unlikely that individuals would experience noise exposure that would result in hearing loss. In fact, it is highly unlikely for an individual living around Ault Field or OLF Coupeville to meet all of the criteria upon which the Potential Hearing Loss (PHL) metric is based. (DEIS, 4-46)

The **Boeing EA-18G Growler** is an American carrier-based electronic warfare aircraft, a specialized version of the two-seat F/A-18F Super Hornet. The EA-18G replaced the Northrop Grumman EA-6B Prowlers in service with the United States Navy. The Growler's electronic warfare capability is primarily provided by Northrop Grumman. The EA-18G began production in 2007 and entered operational service in late 2009.

(Wikipedia) To use studies not based on the Growler and using conveniently old research from 1982, 1999 and 2008 is not using the effects of the actual noise emitted by the EA-18G Growler. In addition it also ignores the unique life style of citizens living in central Whidbey, many of whom are farmers, gardeners, those that have "outdoor jobs" and susceptible children that play outdoors and at the outdoor sports and activity fields. In addition, the statement " no major differences in audiometric test result between military personnel who, as children, had lived......" totally ignores the effects of noise on hearing loss, tinnitus, possible cardiovascular diseases, and the significant increase in compensation for hearing loss and tinnitus for veterans, and other health effects, by sighting outdated studies.

The following study is more pertinent regarding an increase in cardiovascular health risks.

> **Objective** To investigate whether exposure to aircraft noise increases the risk of hospitalization for cardiovascular diseases in older people (≥65 years) residing near airports.
> **Design** Multi-airport retrospective study of approximately 6 million older people residing near airports in the United States. We superimposed contours of aircraft noise levels (in decibels, dB) for 89 airports for 2009 provided by the US Federal Aviation Administration on census block resolution population data to construct two exposure metrics applicable to zip code resolution health insurance data: population weighted noise within each zip code, and 90th percentile of noise among populated census blocks within each zip code.
> **Setting** 2218 zip codes surrounding 89 airports in the contiguous states.
> **Participants** 6 027 363 people eligible to participate in the national medical insurance (Medicare) program (aged ≥65 years) residing near airports in 2009.
> **Main outcome measures** Percentage increase in the hospitalization admission rate for cardiovascular disease associated with a 10 dB increase in aircraft noise, for each airport and on average across airports adjusted by individual level characteristics (age, sex, race), zip code level socioeconomic status and demographics, zip code level air pollution (fine particulate matter and ozone), and roadway density.
> **Results** Averaged across all airports and using the 90th percentile noise exposure metric, a zip code with 10 dB higher noise exposure had a 3.5% higher (95% confidence interval 0.2% to 7.0%) cardiovascular hospital admission rate, after controlling for covariates.
> **Conclusions** Despite limitations related to potential misclassification of exposure, we found a statistically significant association between exposure to aircraft noise and risk of hospitalization for cardiovascular diseases among older people living near airports.
> (Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases: multi-airport retrospective study
> Andrew W Correia, quantitative analyst, Junenette L Peters, assistant professor,Jonathan I Levy, professor, Steven Melly, geographic information

systems specialist, and Francesca Dominici, professor, associate dean of information technology;BMJ. 2013; 347: f5561.)

As of 8/2012, a visit to the National Library of Medicine's search engine, Pubmed, revealed 6260 research articles concerning noise induced hearing loss published since 1951. At the (American Hearing Research Foundation (AHRF.) It appears obvious that the DEIS and the Wylie report have chosen only those articles that seem to support their outdated assumption based primary on computer modeling rather than actual sound measurement at and around OLFC

It is ludicrous to state that it would take "daily exposure to high noise over a normal working lifetime of 40 years, with exposure lasting 8 hours per day for 5 days per week..." to be at risk for a permanent hearing loss. The cochlea can be easily damaged by loud blasts and ignores the Navy's own conclusions and ignores impulse (impact) noise. To quote:

> "The Navy considers any sound above 84dB as noise hazardous, or having the potential to cause hearing loss. Prolonged not at levels greater than 84dB over and 8 hour period may result in temporary, and gradually permanent, hearing loss." "Hearing loss may result in diminished quality of life because of loss of ability to communicate and social isolation, as well as impaired and misinterpreted communication with family members, the public, and co-workers." The economic effects of hearing loss to the Navy include lost time and decreased productivity, loss of qualified workers through medical disqualification, civilian workers' compensation costs, and military disability settlements, retraining, and expenses related to medical intervention such as hearing aids and audiometric testing. On aircraft carrier flight decks, flight operations are confined to a 4.5-acre area as compared to land-based flight operations that are normally conducted on 10,000 acres (**in comparison COLF encompasses only 700 acres**). Noise levels on the flight deck can exceed 145dBA. Below the flight deck is the gallery deck in which approximately 1400 sailors live and work. The high noise levels directly above adversely impact most of the gallery deck. Gallery deck noise levels, often in excess of 100dBA, can have the effect of reducing cognitive skill levels and cause miscommunication problems, both causes of fatal accidents.

In addition the

> Environmental Noise Projection, Environmental noise is a concern with regard to environmental compliance and encroachment of military operations on adjacent civilian activities.The "buy quiet" approach requires designers and engineers to obtain noise emission data before purchasing to choose the quietest available and affordable equipment. Noise emission values obtained from various

suppliers can be compared with each other, and can be used for prediction of the noise levels in the area where equipment is to be placed.
Even though quieter equipment generally can be more expensive.

Occupational hearing loss has human, economic, and readiness impacts.

Hearing loss may result in diminished quality of life of Navy personnel including isolation from social interaction. The economic effects of hearing loss to the Navy include lost time and decreased productivity, loss of qualified workers through medical disqualification, civilian workers' compensation costs and military disability settlements, retraining, and expenses related to medical intervention (e.g., costs of hearing aids and audiometric testing). Noise-impaired communications affect combat performance, and noisy ship systems mean a ship signature that is easily tracked.
(Acquisition Safety-Noise Control Aboard Navy Ships, Naval Safety Center; 2/5/2014)

It is not only surprising, but almost shocking that the DEIS does not, at any time, reveal the effects of noise on a civilian population. The DEIS must, obviously, consider the civilian population as collateral damage without any compensatory measures.

From Norway, the Navy personnel with the highest noise exposure performed poorer on a cognitive performance test than personnel with the lowest noise exposure. (Kaja Irgens-Hansen, May 6, 2016, University of Bergen,Norway; Effects of noise exposure among Navy Personnel.)

To state that hearing loss will only affect citizens in Central Whidbey in 40 years continues to undermine the probable effects of loud noise emitted by the Growlers. While the noise may result in temporary hearing threshold shifts the lack of understanding how the cochlea works is evident:

"in humans and chinchillas, behavioral measures of ATS (Asymptotic threshold shift) completely or almost completely recovered from ATS exceeding 60 dB as long as the exposure duration lasted only 1 week; however, for very long exposure durations lasting as long as 161 weeks, hearing thresholds from a 50 dB ATS only recovered 10-15 dB resulting in PTS" (Permanent Threshold Shift) (Carder and Miller, 1971, Carder, 1972, Mills and Talo, 1972, Mills et al., 1979, Cody and Johnstone, 1981, Clark, 1991, Melnick, 1991).

Likewise, hearing thresholds from a prolonged noise exposure only partially recovered when guinea pigs were continuously noise exposed for 120 days (Syka and Popelar, 1980). For 40-45 dB of ATS, there was only 15-20 dB of hearing recovery leaving a significant permanent hearing loss of 20-35 dB at frequencies within and above the noise band. In the present study in rats, a 55 dB CTS was reached. After the five week escalating noise exposure, there was

only ~20 dB of recovery resulting in a permanent threshold shift of 30-40 dB and significant OHC and IHC loss in the high frequency region of the cochlea.

ABR auditory brainstem response
ATS asymptotic threshold shift
IHC inner hair cell
PNITS prolonged noise exposure-induced threshold shift
NBN narrow band noise
NIHL noise induced hearing loss
NL noise level
OHC outer hair cells
PTS permanent threshold shift

(Prolonged noise exposure-induced auditory threshold shifts in rats Guang-Di Chen,* Brandon Decker, Vijaya Prakash Krishnan Muthaiah, Adam Sheppard, and Richard Salvi,Hear Res. 2014 Nov; 317: 1–8. Published online 2014 Sep 9, 2014)

This article disputes clearly the assumption of permanent threshold shift would take "40 years." Temporary threshold shifts in hearing become less and less temporary with the continuation of that exposure without protection. The consistent exposure to the broad frequency emission by the Growlers can cause hearing loss relatively quickly the closer people live to OLFC. Some people are particularly sensitive to impact noise and could experience significant, permanent hearing loss in **one** touch and go. Especially since many are exposed to high level impulse noise (acute noise over 100dB) which will occur over 30,000 times annually. Anyone working or recreating outside may suddenly be exposed to levels one 100dB. Many of us have measured noise levels up to 130dB(A). Ask any Audiologist how often they see patients that have experienced permanent hearing loss from one cherry bomb (firecracker) or one rifle shot. In addition the **most compensated** injuries **in the military are tinnitus and hearing loss**. Billions of dollars are spent annually by the Department of Veteran Affairs for those injuries that are permanent. All branches of the military services are actively trying to reduce these significant costs. (US Department of Veterans Affairs, Veterans Benefits Administration, Compensation, Service-Connected Disability or Death Benefits FY2013,released 07/17/2014) Civilians living under and near the flight path at OLFC where persistent noise from the Growler also affects their hearing and general health are NOT afforded the same compensation nor treated the same as members of the military and veterans. The Navy does not even warn civilians, in the most minimal way, by putting up warning signs that they may be entering a significant noise area around and near OLFC, such as these.


Warning noise levels of
85 dB(A) or above
Ear protection
must be worn

At a conference by the US Navy in 2013: Shipboard Noise Control on US Navy Aircraft Carriers
NHCA Conference St. Petersburg, FL February 24, 2013 the conclusions were as follows:

Summary and Conclusions
• Designer NOISETM acoustic modeling software accurately predicted noise levels for treated and untreated compartments

- Tech21 Silent-R spray-on damping treatment shown to be effective resulting in noise reduction of 5-7 dBA in treated compartments
- Data measured from on-deck microphones and accelerometers on flight deck underside was successfully used to determine inputs to acoustic models and validate source levels
- Acoustic array data verified surfaces that were the most important contributors to overall noise levels in measured compartments and also showed a significant reduction in acoustic "hot spots" after treatment
- Designer NOISETM can be used to develop an optimized noise reduction plan wrt cost, weight and effectiveness of treatment options.

According to the USEPA, changes in hearing level of less than 5dB are generally not considered noticeable. YET *The range of potential NIPTS could be up to 9.5 dB at Ault Field and 7.5 dB at OLF Coupeville.*(DEIS, pg.4-46)

This is an admission that hearing loss is inevitable. While a change in hearing level of 5dB is not noticeable it certainly can change a hearing test result from "normal hearing" at an average of 24dB (at 500, 1000, 2000Hz respectively) to and average of 29dB which is considered to be a hearing loss significant enough to require amplification. The 5dB decrease in the DEIS is cherry picked and is useless in any audiological analysis. Also it should be noted AGAIN that none of the noise analysis in the Wylie report in the appendix is based on real time measurements.

NON-AUDITORY HEALTH EFFECS

The results of most cited studies are inconclusive and cannot identify a causal link between aircraft noise exposure and the various type of non-auditory health effects that were studied. An individual's health is greatly influenced by many factors known to cause health issues, such as hereditary factors, medical history, and life style choices regarding smoking, diet, and exercise. (DEIS, pg. 4-50)

While there may be other factors contributing to the non-auditory effects on humans this conclusion is disingenuous since aircraft noise at night has a significantly impacts sleep, addressed earlier in this response, which is admitted by the DEIS, pg. 4-43. Again the DEIS is attempting to undermine scientific evidence.

Vibration Effects from Aircraft Operations

While DEIS admits that low frequency vibration may have affect on structures it ignores the possible effects of low frequency vibration exposure on health which:

> "...causes are connective tissue diseases, tissue injury, diseases of the blood vessels..."
> Whole-body vibration can cause fatigue, insomnia, stomach problems, headache and "shakiness" shortly after or during exposure. The symptoms are similar to those that many people experience after a long car or boat trip. After daily exposure over a number of years, whole-body vibration can affect the entire body and result in a number of health disorders. Sea, air or land vehicles cause motion sickness when the vibration exposure occurs in the 0.1 to 0.6 Hz frequency range. Studies of bus and truck drivers found that occupational exposure to whole-body vibration could have contributed to a number of circulatory, bowel, respiratory, muscular and back disorders. The combined effects of body posture, postural fatigue, dietary habits and whole-body vibration are the possible causes for these disorders.
> Studies show that whole-body vibration can increase heart rate, oxygen uptake and respiratory rate, and can produce changes in blood and urine. East European researchers have noted that exposure to whole-body vibration can produce an overall ill feeling which they call "vibration sickness."
> Many studies have reported decreased performance in workers exposed to whole-body vibration. "(Canadian Centre for Occupational Health and Safety, Fact Sheet, 1/24/2017)

Another study cites low frequency vibration:

> "diminishes with decreasing frequency. This should be taken into account by the setting of limits concerning the health risks. Sufficient safety margins are recommended. The use of a frequency weighting with an attenuation of the low frequencies (e.g. G-weighting) does not seem to be appropriate for the evaluation of the health risks caused by LFN (Low Frequency Noise) up to 100 Hz. It may be proposed to measure third octave band spectra or narrow band spectra. A comparison with the known human responses caused by the measured levels and frequencies could help to evaluate the health risks. Some proposals for further investigations were given: (1) experimental methods to discover the ways mediating the effects of low frequency noise, (2) consideration of the individual hearing threshold or hearing threshold shift and of the vibrotactile threshold in the low frequency range to be able to judge the effects, (3) consideration of combined body vibration caused by airborne low frequency noise or by other sources, (4) modeling to analyze the

transmission of the acoustic energy from the input into the body to the structures containing sensors, (5) consideration of **probable risk groups like children or pregnant women."** (Noise Health. 2004 Apr-Jun;6(23):73-85. Effects of low frequency noise up to 100 Hz.Schust M1.)

Ultrasonic noise may affect hearing and non-hearing parts of the body. Because audible noise is also present in industrial conditions, it is difficult to interpret the results of environmental studies on the effects of ultrasounds on hearing [37, 38,39]. Furthermore, the age of study participants and the potential presence of chemical factors in the working environment are also important. Nevertheless, some reports indicated that components with ultrasonic frequencies may cause sound sensations associated with hearing defects within the high frequency range, which audiometric tests do not always taken into account [15, 20]. Subjective symptoms like headache and dizziness, tinnitus, balance disturbances and nausea are typical for workers exposed to ultrasounds of low frequencies. Health standards are to prevent subjective effects of exposure to ultrasonic noise and hearing damage. Proposals of these standards were based on two basic assumptions: (a) high audible frequencies may cause annoyance, tinnitus, headache, fatigue and nausea and (b) ultra-sound components with high sound pressure level may cause hearing damage. Therefore, admissible values were determined at a level that does not eliminate hearing damage and subjective effects (fatigue, headache, nausea, tinnitus, vomiting, etc.) [40, 41, 42, 43].

In conclusion, studies conducted to date in Poland and worldwide indicate that ultrasonic noise may cause excessive fatigue, headache, discomfort and irritation. There are some analogies between ultrasonic and audible noise. Audible noise with sound level not exceeding 80 dB(A) is perceived as causing discomfort and having a negative effect on human cognitive functions. Irritation caused by ultrasonic noise may cause reduced work effectiveness [46, 47]. (International Journal of Occupational Safety and Ergonomics, Effects of Ultrasonic Noise on the Human Body-A Bibliographic Review,2013, Vol. 19, No. 20)

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We can conclude from the significant bibliography that there is enough scientific evidence indicating that low frequency vibration has an effect of human health.

Single Event Noise

This analysis shows that while there may not be a substantive difference in the loudest event at a particular POI, there may be a difference in the number of times that loudest event would occur between alternatives and compared to the No Action Alternative. (DEIS,4-63)

As stated previously, sudden unexpected noise evokes reflex responses. Sudden noise also creates a "fight or flight" response increasing cortisol levels. Noise exposure of sufficient intensity, duration, and unpredictability provokes changes that may not be so readily reversible.

> **Acoustic trauma** is the sustainment of an injury to the eardrum as a result of a very loud noise. Its scope usually covers loud noises with a short duration, such as an explosion, gunshot or a burst of loud shouting. The range of severity can be from increased pain to permanent hearing loss.(Wikipedia)

In addition **Acute acoustic trauma**

> refers to permanent cochlear damage from a one-time exposure to excessive sound pressure. This form of NIHL (Noise Induced Hearing loss) commonly results from exposure to high-intensity sounds such as explosions, gunfire, a large drum hit loudly, and firecrackers. (Wikipedia)

The sudden and unexpected impact noise will damage the hair cells in the cochlear and hair cell death. This damage usually affects the outer hair cells which usually distorts the higher frequencies where many of the consonants of the English language are perceived causing significant distortion to speech understanding. Many people state that they have no other symptoms other than "people are mumbling" but "I hear just fine." This also occurs after persistent noise exposure. In addition there may be tissue damage can cause fluid leakage:

> During cell death 'scars' develop, which prevent potassium rich fluid on the endolymph from mixing with the fluid on the basal domain.[53] The fluids are kept from mixing because the potassium rich fluid is toxic to the neuronal endings and can damage hearing of the entire ear. If the endolymph fluid mixes with the fluid on the basal domain the neurons become depolarized, causing complete hearing loss. In addition to complete hearing loss, if the area is not sealed and leakage continues further tissue damage will occur. The 'scars' that form to replace the damaged hair cell are caused by supporting hair cells undergoing apoptosis and sealing the reticular lamina, which prevents fluid leakage.[53] The cell death of two supporting hair cells rapidly expands their apical domain, which compresses the hair cell beneath its apical domain.[53]

Recent studies have investigated additional mechanisms of NIHL involving delayed or disabled electrochemical transmission of nerve impulses from the hair cell to and along the auditory nerve. In cases of extreme acute acoustic trauma, a portion of the postsynaptic dendrite (where the hair cell transfers electrochemical signal to the auditory nerve) can rupture from overstimulation, temporarily stopping all transmission of auditory input to the auditory nerve. This is known as excitotoxicity. Usually, this sort of rupture heals within about five days, resulting in functional recovery of that synapse. While healing, an over-expression of glutamate receptors can result in temporary tinnitus, or ringing in the ears. Repeated ruptures at the same synapse may eventually fail to heal, leading to permanent hearing loss.[54]
Acoustic over-exposure can also result in decreased myelination at specific points on the auditory nerve. Myelin, an insulating sheath surrounding nerve axons, expedites electrical impulses along nerves throughout the nervous system. Thinning of the myelin sheath on the auditory nerve significantly slows the transmission of electrical signals from hair cell to auditory cortex, reducing comprehension of auditory stimuli by delaying auditory perception, particularly in noisy environments.[55]

There appear to be large differences in individual susceptibility to NIHL.[56] The following factors have been implicated:

- missing acoustic reflex[15]
- previous sensorineural hearing loss[57]
- a bad general health state: bad cardiovascular function, insufficient intake of oxygen, a high platelet aggregation rate; and most importantly, a high viscosity of the blood[15]
- cigarette smoking[57]
- exposure to ototoxic chemicals (medication or environmental chemicals that can damage the ear), including certain solvents and heavy metals[38][57][58]
- type 2 diabetes[57]

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(Wikipedia)

Because the individual is assumed to be indoors for this analysis, noise level reduction factors were applied because the walls, doors, insulation, and other building features reduce the noise levels inside. (DEIS, pg. 4-66)

This statement is another assumption ask anyone living in Central Whidbey. Communicating in the house, while the Growlers are flying is **impossible.** Conversations, speaking on the phone, watching TV cannot be done unless the volume is so loud that it can also add to the potential hearing loss and stress.

Noise Associated with Aircraft Operations

New areas that were not previously within the 65 dB DNL noise contour generated by Navy aircraft operations under the No Action Alternative would be under the 65 dB DNL noise contour associated with the action alternatives. Although some of these areas are over water, others are over land and would therefore result in some additional people living within the 65 dB DNL noise contour.
Other supplemental metrics utilized in the analysis show additional events of indoor and outdoor speech interference, an increase in the number of events causing classroom/learning interference, an increase in the probability of awakening, and an increase in the population that may be vulnerable to experiencing potential hearing loss of 5 dB or more.
Noise contours produced by the model allow a comparison of existing conditions and proposed changes or alternative actions that do not currently exist or operate at the installation. For these reasons, on-site noise monitoring is seldom used at military air installations, especially when the aircraft mix and operational tempo are not uniform.
Other supplemental metrics utilize in the analysis show addition events of indoor and outdoor speech interference, and increase in the number of events causing classroom/learning interference, an increase in the probability of awakening, and an increase in the population that may be vulnerable to experiencing potential hearing loss of 5dB or more. (Draft EIS, Nov. 2016, p 4-20.)

The EPA: recommends a limit of 55dB /24 hrs., with nighttime weighed more heavily due to sleep disturbance. Western Europe understands better than US the effects of noise. The most recent studies are almost 40 yrs. old. How much noise exposure is safe without consequences is unknown, but clearly has serious risk factors for health.

The World health Organization (WHO) has documented seven categories of adverse health and social effects of noise pollution, whether occupational, social or environmental. These sever are:

1.hearing impairment
2.interference with spoken communication
3.cardiovascular disturbances
4.mental health problems
6.impaired cognition
7.negative social behaviors and sleep disturbance

The latter is considered the most deleterious non-auditory effect because of its impact on quality of life and daytime performance.

> Environmental noise, especially that caused by transportation means, is a growing problem in our modern cities . It is considered a major cause of exogenous sleep disturbances, after somatic problems and day tensions. Nocturnal air traffic causes nocturnal awakenings at levels as low as 48 dB, and physiological reactions in the form of increased vegetative hormonal secretions,

> cortical arousals and body movements at even lower levels, probably around 33 dB, and interestingly some epidemiological data support the hypothesis that exposure to noise at night time may be especially relevant in terms of negative cardiovascular outcomes, perhaps due to the fact that repeated autonomic arousals habituate to a much lesser degree to noise than cortical arousals. Indeed data show that exposure to traffic noise especially at night increases the risk for hypertension, also in children, as well as the risk for heart disease and stroke (Environmental noise and sleep disturbances: A threat to health? Demian Halperinn Department of Psychiatry, Barzilai Medical Center, Haistadrut Street 2, Ashkelon 78278, Israel November, 2014)

Noise exposure also affects the endocrine system (Deepak Prasher prof at Univ. College in London).

All research articles addressing sleep disturbance due to noisepolution indicate that there is a significant domino effect on health impacts, quality of life and the economy.

Under Alternative 1, the majority of the POIs analyzed show an increase in the percent probability of awakening for all scenarios during nights of average aircraft activity. The highest percent increase is for R06 (Admirals Drive and Byrd Drive), where there would be an increase of 48 percent under Scenario A with windows open, meaning that there is a 48-percent greater probability, or chance of awakening at least once under windows-open conditions compared to the No Action Alternative. Generally, the POIs around OLF Coupeville had a higher percent probability of awakening under Scenario A than under Scenarios B or C, and for the POIs around Ault Field, there was a larger increase in the percent probability of awakening for Scenario C than Scenarios A or B. (DEIS, November 2015, p4-42)
Also see Table 4.2-6 , page 4-43 ***Average Indoor Nightly Probability of Awakening for Representative Points of Interest in the vicinity of the NAS Whidbey Island Complex, Alternative 1(Average Year)*** *(DEIS, November 2015, 4-43)*
This table states that in Central Whidbey under No Action Alternative with the ***windows open*** *there is a probability of awakening 21% which would change to 29% (scenario A) to 36% (scenario B) and 41% (scenario C.)*
With the ***windows closed*** *there is no change under the no action alternative, 14% (scenario A) 17% (scenario B) 20% (Scenario C.)*

There is obviously an increase in the number of sleep disturbances that Central Whidbey will be experiencing. The increase is significant both economically and health wise. Particularly since NASW insists that they need the inadequate OLFC for night time practice, despite the large increase in the population and light pollution since 1942 surrounding OLFC.
Noise pollution decreases the efficiency of people, decreases concentration, increases fatigue and those exposed constantly to loud noise increases anxiety.

> A -5dB decrease reduce HBP by 1.4%, cardio disease by 1.8% Economic benefit estimated at 3.9 billion. Among women chronic exposure increases risk of cardiovascular mortality by 80% .(American Journal of Preventative Medicine, May 25, 2015)

Noise-induced sleep disturbance constitutes an important mechanism on the pathway from chronic noise exposure to the development of adverse health effects. The results call for more initiatives aimed at reducing environmental noise exposure levels to promote cardiovascular and public health. Recent studies indicate that people's attitude and awareness in particular towards aircraft noise has changed over the years. Noise mitigation policies have to consider the medical implications of environmental noise exposure. Noise mitigation strategies to improve public health include noise reduction at the source, active noise control (e.g. noise-optimized take-off and approach procedures), optimized traffic operations (including traffic curfews), better infrastructural planning, better sound insulation in situations where other options are not feasible, and adequate limit values.

(Cardiovascular effects of environmental noise exposure
Thomas Münzel,1,* Tommaso Gori,1 Wolfgang Babisch,2 and Mathias Basner3
Eur Heart J. 2014 Apr 1; 35(13): 829–836.
doi: 10.1093/eurheartj/ehu030)

The aim of enlightened governmental controls should be to protect citizens from the adverse effects of airborne pollution, including those produced by noise. **People have the right to choose the nature of their acoustical environment; it should not be imposed by others.**

Cardiovascular Disturbances

A growing body of evidence confirms that noise pollution has both temporary and permanent effects on humans (and other mammals) by way of the endocrine and autonomic nervous systems. It has been postulated that noise acts as a nonspecific biologic stressor eliciting reactions that prepare the body for a fight or flight response. For this reason, noise can trigger both endocrine and autonomic nervous system responses that affect the cardiovascular system and thus may be a risk factor for cardiovascular disease.These effects begin to be seen with long-term daily exposure to noise levels above 65 dB or with acute exposure to noise levels above 80 to 85 dB. Acute exposure to noise activates nervous and hormonal responses, leading to temporary increases in blood pressure, heart rate, and vasoconstriction. Studies of individuals exposed to occupational or environmental noise show that exposure of sufficient intensity and duration increases heart rate and peripheral resistance, increases blood pressure, increases blood viscosity and levels of blood lipids, causes shifts in electrolytes, and increases levels of epinephrine, norepinephrine, and cortisol.[3] Sudden unexpected noise evokes reflex responses as well. Cardiovascular disturbances are independent of sleep disturbances; noise that does not interfere with the sleep of subjects may still provoke autonomic responses and secretion of epinephrine, norepinephrine, and cortisol.[29] These responses suggest that one can never completely get used to night-time noise.
Temporary noise exposure produces readily reversible physiologic changes. However, noise exposure of sufficient intensity, duration, and unpredictability

provokes changes that may not be so readily reversible. The studies that have been done on the effects of environmental noise have shown an association between noise exposure and subsequent cardiovascular disease. *Even though the increased risk for noise-induced cardiovascular disease may be small, it assumes public health importance because both the number of people at risk and the noise to which they are exposed continue to increase.*
Children are at risk as well. Children who live in noisy environments have been shown to have elevated blood pressures and elevated levels of stress-induced hormones.
(Italics are added)
(Noise Pollution: A Modern Plague, Lisa Goines, RN; Louis Hagler, MD)

More recent studies have suggested that noise levels of 50 dB(A) at night may also increase the risk of myocardial infarction by chronically elevating cortisol production.

> Results suggest associations between community exposure to aircraft noise and the health indicators poor general health status, use of sleep medication, and use of medication for cardiovascular diseases.
> (Aircraft noise around a large international airport and its impact on general health and medication use;
> E Franssen, C M A G van Wiechen, N Nagelkerke, and E Lebret, May 2004)

Sleep deprivation can lead to: Accidental Death, Impaired Brain Activity, Cognitive dysfunction, Memory problems, moodiness, hallucinations, depression, accident prone, weakened immune response, weight gain, HBP, Type 2 Diabetes, heart disease.

> During sleep, the brain rests busy neurons and forms new pathways so you're ready to face the world in the morning. In children and young adults, the brain releases growth hormones during sleep. While you're sleeping, your body is also producing proteins that help cells repair damage.(Written by Ann Pietrangelo Medically Reviewed by George Krucik, MD, MBA on August 19, 2014)

According to the Mayo Clinic, studies show that if you don't get enough sleep, it's more likely that your body won't be able to fend off invaders. It may also take you longer to recover from illness. Long-term sleep deprivation raises your risk of developing chronic illnesses like diabetes and cardiovascular diseases. (Ann Pietrangelo, August 19, 2014)
In addition exposure of about 100dB has lead to significant reduction in testosterone levels in male rodents.

Additional studies are now reporting that jet fuel may impact central nervous system difficulties and may be a contributor to central nervous system hearing loss.

Jet propulsion fuel-8 (JP-8) is a kerosene-based fuel that is used in military jets. The U.S. Armed Services and North Atlantic Treaty Organization countries adopted JP-8 as a standard fuel source and the U.S. military alone consumes more than 2.5 billion gallons annually. Preliminary epidemiologic data suggested that JP-8 may interact with noise to induce hearing loss, and animal studies revealed damage to presynaptic sensory cells in the cochlea. In the current study, Long-Evans rats were divided into four experimental groups: control, noise only, JP-8 only, and JP-8 + noise. A sub-ototoxic level of JP-8 was used alone or in combination with a non-damaging level of noise. Functional and structural assays of the presynaptic sensory cells combined with neurophysiologic studies of the cochlear nerve revealed that peripheral auditory function was not affected by individual exposures and there was no effect when the exposures were combined. However, the central auditory nervous system exhibited impaired brainstem encoding of stimulus intensity. These findings may represent important and major shifts in the theoretical framework that governs current understanding of jet fuel and/or jet fuel + noise-induced ototoxicity. From an epidemiologic perspective, results indicate that jet fuel exposure may exert consequences on auditory function that may be more widespread and insidious than what was previously shown. It is possible that a large population of military personnel who are suffering from the effects of jet fuel exposure may be misidentified because they would exhibit normal hearing thresholds but harbor a "hidden" brainstem dysfunction.
(J Toxicol Environ Health A. 2014;77(5):261-80.)

(Exposure to low levels of jet-propulsion fuel impairs brainstem encoding of stimulus intensity.
Guthrie OW1, Xu H, Wong BA, McInturf SM, Reboulet JE, Ortiz PA, DR.)

Importantly the US Department of Veterans Affairs' Office of Research and Development considers this study as one of their major accomplishments in their research on hearing loss.

The Effect of Loud Noises on the Fetus

Continuous exposure to sounds over about 90 to 100 decibels, about the level of a chainsaw, can raise your unborn baby's risk of hearing loss, according to What to Expect. It also can increase the chances of giving birth prematurely and of having a low-birth weight baby. Shorter occasional exposure to sounds in the 150 to 155 decibel range, the level next to a jet engine, can lead to similar problems. A sudden loud noise also can startle an unborn baby, causing increased activity shortly after the fetus hears the sound. (livestrong.com)

Thus, understanding of occupational and environmental noise is important for public health.

In one study,12 children with high-frequency hearing loss tested at 4 to 10 years of age were more likely to have been born to women who were exposed consistently to occupational noise in the range of 85 to 95 dB during pregnancy. (Lalande NM, Hetu R,